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Monsanto

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SOIL SAMPLE ANALYSIS

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TO Paul Heisler, Safety Dept.

This report summarizes our analytical investigation of the soil sample that was taken from an area of "Dead Creek" near Judith Lane in Cahokia on 8/29/80. The sample was taken in an area where there were reported incidents of sustained smoking and burning of the soil.

I. General Appearance

The sample is moist, dark brown soil with a "musty" type odor but no distinctive chemical odor. The moisture content, determined as loss on drying at 110 C, is 19.5%.

II. Burning Characteristics

A portion of the dry sample was placed in a crucible and slowly heated with a gas burner. The sample started to smoke as it was being heated but no spontaneous ignition occurred. On applying an open flame to the sample, ignition occurred and a self-sustaining combustion continued for several seconds.

After burning subsided the sample was heated with the full heat of the burner for several minutes. Total weight loss on ignition was 33.6%.

III. Phosphorus Analysis

The question arose as to the possibility of elemental phosphorus being the initiator of combustion in the area where the sample was taken. If this were the case, significant amounts of P_2O_5 should be present in the sample.

To test for phosphate, a portion of the original sample was extracted by boiling in water for 1/2 hour. The aqueous extract was tested for phosphate by ion chromatography. None was detected. The lower limit of detection was 10 ppm PO_4 on an original sample basis.

A sulfuric acid-persulfate digestion procedure for total phosphorus (all form of phosphorus) was performed. Total phosphorus was found to be 0.04% (as P). This low level is probably attributable to normal soil background.

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IV. Solvent Extraction and Analysis

A portion of the original sample was extracted with methylene chloride using a SOXHLET extraction apparatus.

A gas chromatographic analysis of the extract was made on a Varian 3700 using a 6 ft. column of 5% Dexil 410 and flame ionization detection. The chromatogram showed an "envelope" of unresolved peaks eluting at high temperature typical of high boiling, high molecular weight, oil.

On evaporation of the methylene chloride from an aliquot of the extract, a dark brown, viscous oil comprising 9.2% by weight of the sample, was recovered.

An infrared analysis of the oil phase gave a spectrum that is typical of long chain aliphatic hydrocarbon. While the oil cannot be identified specifically, it is possible a waste lubricating or crank case oil, etc.

V. Ignition Residue Analysis

The residue remaining after ignition is a fine, brown powder. A semi-quantitative emission spectrographic analysis for metals was run on the residue.

The elements detected and approximate concentrations are as follows:

<u>>1%</u>	<u>0.1 to 1%</u>	<u><0.1%</u>
Si, Fe, Cu	Al, Ca, Mg, Ni Sn, Pb, Ti, Zn	Mn, Cr

Because the copper concentration was felt to be unusually high, a quantitative analysis was made for copper by atomic absorption spectroscopy. The copper concentration was found to be 3.9%

Conclusions

The high concentration of oil found in the sample readily explains the combustible nature of the soil.

There were no indications of any organic chemicals or phosphorus in the sample that might associate it with a WGK origin.

The high level of copper found in the sample could be a clue to the source of the oil.

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